



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME: North American Plant Breeders

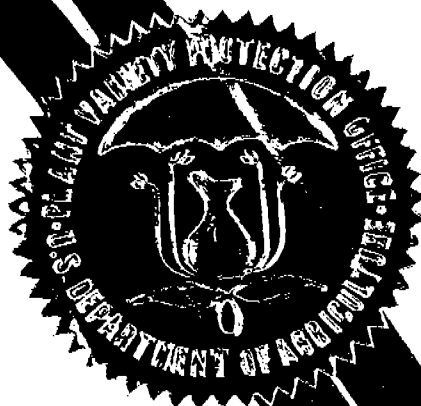
Whereas, THERE HAS BEEN PRESENTED TO THE
Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF *eighteen* YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT (7 U.S.C. 2321 ET SEQ.).

ALFALFA

'Atlas'



In Testimony Whereof, I have hereunto set
my hand and caused the seal of the Plant
Variety Protection Office to be affixed
at the City of Washington
this 11th day of March in
the year of our Lord one thousand nine
hundred and eighty-two.

Attest:

Kenneth A. Evans
Acting
Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

John R. Block
Secretary of Agriculture

INSTRUCTIONS: *See Reverse.*

1

EXHIBIT A

Origin and Breeding History

ATLAS

Beginning in 1971 Atlas was developed using an average of three cycles of phenotypic recurrent selection for anthracnose resistance followed by one cycle of selection for bacterial wilt resistance. Anthracnose screening was done in greenhouse benches using the basic technique (pure culture) described in ARS-NC-19. Bacterial wilt screening was done using the procedures described in ARS-NC-19. A minimum of two hundred plants per germplasm pool were intercrossed following each cycle of selection for anthracnose resistance. Sufficient numbers were screened (\pm 110,000 for total anthracnose program) so that plants were selected for vigor as well as anthracnose resistance. Final selections (1407) were made from the bacterial wilt nursery in November, 1973, keeping approximately the top 8% based on resistance and general desirability.

Approximately 50% of the parentage traces to the hardy germplasm pool predominately Titan, Vernal and Weevilchek, and 50% to the Flemish germplasm pool predominately Anchor and Saranac. Numerous selections were also made from many other sources including Beltsville 1An4, 2An4, and 3An4. The Flemish and hardy germplasm pools were first combined for the production of breeder seed.

Breeder seed (2 crops) of Atlas was produced on the 1407 parent clones in the greenhouse (16 hour daylength) at Brookston, Indiana, between November 16, 1973 and August 30, 1974. This original production is sufficient for the life of the variety and is held in controlled storage. This will ensure stability of the variety. Certified seed will be produced only from breeders or foundation seed. Seed produced from certified seed will not be recognized as Atlas.

AMENDED EXHIBIT A

ATLAS: Origin and Breeding History

It is confirmed that during seed production no variants beyond the limits defined under Exhibit C have been found and that the multiplication procedure will ensure that the seed being sold as Atlas will not have shifted in characteristics beyond accepted limits for alfalfa varieties.

ADDENDUM TO EXHIBIT A

ATLAS - - UNIFORMITY

It is also confirmed that:

"ATLAS MEETS PRESENTLY ACCEPTABLE LEVELS
OF UNIFORMITY FOR ALFALFA VARIETIES."

NORTH AMERICAN PLANT BREEDERS

Aug. 1, 1978
Date

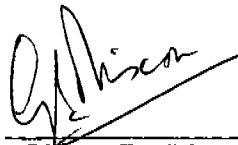

Giles E. Dixon
Research Director

EXHIBIT B

Botanical description of Atlas

Atlas exhibits good seedling vigor, upright growth, fast recovery after cutting and fall growth similar to Saranac. Atlas is moderately uniform in plant type (leaf size, stem size, fall dormancy) with some plants showing either Flemish or northern hardy characteristics with most intermediate.

Atlas flowers 2-3 days earlier than Vernal and 2-3 days later than Citation. Flowers are mostly shades of purple with a few blues and very few cream.

Bacterial wilt resistance is similar to Vernal with anthracnose resistance in the 50% range. Resistance to downy mildew is moderate with leafhopper yellowing tolerance slightly above Saranac. Forage yield is high with seed yield similar to Titan.

OBJECTIVE DESCRIPTION OF VARIETY
Alfalfa (Medicago sativa L. complex)

NAME OF APPLICANT(S) North American Plant Breeders		VARIETY NAME OR TEMPORARY DESIGNATION Atlas
ADDRESS (Street and No., or R.F.D. No., City, State, and Zip Code) P. O. Box 991 Little Rock, Arkansas 72203		FOR OFFICIAL USE ONLY PVPO NUMBER 7600022

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. or) when number is either 99 or less or 9 or less.

NOTE: For single plant data a minimum of 100 plants is suggested

1. PRIMARY AREA OF ADAPTATION All except # 5 <input type="checkbox"/> 1 = NORTHWEST 2 = NORTHCENTRAL 3 = NORTHEAST <input type="checkbox"/> 4 = SOUTHEAST 5 = SOUTHWEST 6 = SOUTHERN PLAINS <input type="checkbox"/> 7 = INTERMOUNTAIN		INDICATE AREA WHERE TEST WAS CONDUCTED. FURTHER EXPLANATION CAN GO IN COMMENTS AT THE END OF THE FORM. <input type="checkbox"/> AREA TESTED 2, 4, 6							
2. WINTER HARDINESS <input type="text" value="5"/> DCA PER LETTER OF 16 NOV 1981 <input checked="" type="checkbox"/> 1 = NON-HARDY (Mesa Sirsa) 3 = INTERMEDIATE NON-HARDY <input type="checkbox"/> 5 = MODERATELY HARDY (Saranac) 7 = HARDY (Vernal) <input type="checkbox"/> 9 = EXTREMELY HARDY (Norseman) <input type="text" value="1"/> SOURCE OF INFORMATION: 1 = ANTICIPATED 2 = MEASURED		<input type="text" value="2"/> AREA TESTED							
3. FALL GROWTH HABIT <input type="text" value="5"/> 1 = ERECT (Mesa Sirsa) 3 = SEMIERECT (DuPuits) 5 = INTERMEDIATE (Saranac) 7 = SEMIDECUMENT (Vernal) 9 = DECUMBENT (Norseman)		<input type="text" value="2"/> AREA TESTED							
4. RECOVERY AFTER FIRST SPRING CUTTING <input type="text" value="3"/> 1 = VERY FAST (Mesa Sirsa) 3 = FAST (Saranac) 5 = INTERMEDIATE 7 = SLOW (Vernal) 9 = VERY SLOW (Norseman)		<input type="text" value="2"/> AREA TESTED							
5. FLOWERING DATE (FIRST SPRING GROWTH) <table border="0"> <tr> <td><input type="text" value=""/><input type="text" value=""/> DAYS EARLIER THAN</td> <td><input type="text" value=""/> 1 = MESA SIRSA 2 = LAHONTAN</td> </tr> <tr> <td><input type="text" value=""/><input type="text" value=""/> DAYS LATER THAN</td> <td><input type="text" value=""/> 3 = SARANAC 4 = VERNAL</td> </tr> <tr> <td></td> <td>5 = NORSEMAN</td> </tr> </table>		<input type="text" value=""/> <input type="text" value=""/> DAYS EARLIER THAN	<input type="text" value=""/> 1 = MESA SIRSA 2 = LAHONTAN	<input type="text" value=""/> <input type="text" value=""/> DAYS LATER THAN	<input type="text" value=""/> 3 = SARANAC 4 = VERNAL		5 = NORSEMAN	<input type="text" value=""/> AREA TESTED	
<input type="text" value=""/> <input type="text" value=""/> DAYS EARLIER THAN	<input type="text" value=""/> 1 = MESA SIRSA 2 = LAHONTAN								
<input type="text" value=""/> <input type="text" value=""/> DAYS LATER THAN	<input type="text" value=""/> 3 = SARANAC 4 = VERNAL								
	5 = NORSEMAN								
6. CROWN TYPE <input type="text" value="6"/> 1 = SPREADING ROOTS 3 = SPREADING RHIZOMES (Teton) 5 = BROAD (Vernal) 7 = INTERMEDIATE (Saranac) 9 = NARROW (Mesa Sirsa)		<input type="text" value="2"/> AREA TESTED							
7. PLANT COLOR <input type="text" value="5"/> 3 = DARK GREEN (Weevilchek) 5 = GREEN (Vernal) 7 = LIGHT GREEN (Ranger)		<input type="text" value="2"/> AREA TESTED							
8. HAIRINESS <table border="0"> <tr> <td><input type="text" value=""/><input type="text" value=""/><input type="text" value=""/></td> <td>% PLANTS WITH PUBESCENT STEMS</td> <td><input type="text" value="0"/><input type="text" value="7"/><input type="text" value="7"/></td> <td>% PLANTS WITH PUBESCENT PODS</td> </tr> </table>			<input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/>	% PLANTS WITH PUBESCENT STEMS	<input type="text" value="0"/> <input type="text" value="7"/> <input type="text" value="7"/>	% PLANTS WITH PUBESCENT PODS			
<input type="text" value=""/> <input type="text" value=""/> <input type="text" value=""/>	% PLANTS WITH PUBESCENT STEMS	<input type="text" value="0"/> <input type="text" value="7"/> <input type="text" value="7"/>	% PLANTS WITH PUBESCENT PODS						
9. POD SHAPE <table border="0"> <tr> <td><input type="text" value="0"/><input type="text" value="8"/><input type="text" value="2"/></td> <td>% PLANTS WITH TIGHT COILS</td> <td><input type="text" value="0"/><input type="text" value="1"/><input type="text" value="8"/></td> <td>% PLANTS WITH LOOSE COILS</td> <td><input type="text" value="0"/><input type="text" value="0"/><input type="text" value="0"/></td> <td>% PLANTS WITH SICKLE PODS (Less than 1 coil)</td> </tr> </table>				<input type="text" value="0"/> <input type="text" value="8"/> <input type="text" value="2"/>	% PLANTS WITH TIGHT COILS	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="8"/>	% PLANTS WITH LOOSE COILS	<input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/>	% PLANTS WITH SICKLE PODS (Less than 1 coil)
<input type="text" value="0"/> <input type="text" value="8"/> <input type="text" value="2"/>	% PLANTS WITH TIGHT COILS	<input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="8"/>	% PLANTS WITH LOOSE COILS	<input type="text" value="0"/> <input type="text" value="0"/> <input type="text" value="0"/>	% PLANTS WITH SICKLE PODS (Less than 1 coil)				

ITEM LENGTH FREQUENCY DISTRIBUTION FOR SUBMITTED AND 1 TO 5 STANDARD VARIETIES 1/

VARIETY NAME	STEM LENGTH FREQUENCY DISTRIBUTION 2/											AVERAGE STEM LENGTH
	0 - 5 mm. %	6 - 10 mm. %	11 - 15 mm. %	16 - 20 mm. %	21 - 30 mm. %	31 - 40 mm. %	41 - 50 mm. %	51 - 60 mm. %	61 - 70 mm. %	71 - 80 mm. %	81 + mm. %	

11. FLOWER COLOR 3/ (DETERMINE COLOR ON FRESHLY OPENED FLOWERS)

0 8 0 % PURPLE 0 1 9 % VARIEGATED 0 0 0 % YELLOW 0 0 1 % CREAM 0 0 0 % WHITE

12. DISEASE, INSECT, AND NEMATODE RESISTANCE: (Enter resistance of submitted and check cultivars. Circle check cultivars used.)

DISEASE	CULTIVAR	% RESISTANT PLANTS	AVG. SEVERITY INDEX (ASI)	ASI LSD .05	TEST, YEAR & LOCATION 4/
BACTERIAL WILT	(SUBMITTED)	31.2	2.24	.32	Univ. Minn. 1975 (Table 10)
	(RES. CK.) VERNAL	34.2	2.30		
	(SUS. CK.) NARRAGANSETT	0.9	4.01		
ANTHRACNOSE	(SUBMITTED)	48			Av. 3 tests (2 for Saranac) Table 11
	(RES. CK.) ARC	64			
	(SUS. CK.) SARANAC	7.8			
COMMON LEAF SPOT	(SUBMITTED)				
	(RES. CK.) RAMSEY				
	(SUS. CK.) RANGER				
DOWNY MILDEW	(SUBMITTED)	12.0			Kansas State 1975 (Table 12)
	(RES. CK.) SARANAC	21.5			
	(SUS. CK.) KANZA	1.1			
PHYTOPHTHORA ROOT ROT	(SUBMITTED)	0.0	5.51	.49	Univ. Minn. 1975 (Table 14)
	(RES. CK.) AGATE	20.0	3.34		
	(SUS. CK.) SARANAC	0.0	5.26		
OTHER	(SUBMITTED)				
	(RES. CK.)				
	(SUS. CK.)				

1/ Preferred standards: Saranac, Vernal, Norseman, Lahontan, Mesa Sirsa. Twelve hours light at 25° C with 20,000 lux of cool white florescent; 2,000 lux of incandescent filament light and twelve hours darkness at 5° C.

2/ From cotyledonary node to tip of stem 20 days after planting.

3/ For further clarification consult USDA Agricultural Handbook No. 424.

4/ Give: The institution in charge of test, (2) year, and (3) location of test. Describe test procedure if it differs from procedure suggested in ARS-NC-19, September 1974.

12. DISEASE, INSECT, AND NEMATODE RESISTANCE: (Enter resistance of submitted and check cultivars. Circle check cultivars used.)

DISEASE	CULTIVAR	% RESISTANT PLANTS	AVG. SEVERITY INDEX (ASI)	ASI LSD .05	TEST, YEAR & LOCATION ^{4/}
OTHER	(SUBMITTED)				
	(RES. CK.)				
	(SUS. CK.)				
OTHER	(SUBMITTED)				
	(RES. CK.)				
	(SUS. CK.)				
INSECT	CULTIVAR	% SEEDLING SURVIVAL	AVG. SEVERITY INDEX (ASI)	ASI LSD .05	TEST, YEAR & LOCATION ^{4/}
PEA APHID	(SUBMITTED)				
	(RES. CK.) KANZA				
	(SUS. CK.) RANGER				
SPOTTED ALFALFA APHID	(SUBMITTED)				
	(RES. CK.) KANZA				
	(SUS. CK.) RANGER				
INSECT	CULTIVAR	% DEFOLIATION	AVG. SEVERITY INDEX (ASI)	ASI LSD .05	TEST, YEAR & LOCATION ^{4/}
ALFALFA WEEVIL	(SUBMITTED)				
	(RES. CK.) ARK				
	(SUS. CK.) VERNAL				
INSECT	CULTIVAR	% RESISTANT PLANTS	EMERGED ADULTS PER PLANT	EMERGED LSD .05	TEST, YEAR & LOCATION ^{4/}
ALFALFA SEED CHALCID	(SUBMITTED)				
	(RES. CK.) LAHONTAN				
	(SUS. CK.) SONORA				
INSECT	CULTIVAR	% RESISTANT PLANTS	AVG. SEVERITY INDEX (ASI)	ASI LSD .05	TEST, YEAR & LOCATION ^{4/}
POTATO LEAF-HOPPER	(SUBMITTED)	38	3.95		NAPB Ames, Iowa 1975 (Table 17)
	Weevilchek (RES. CK.)	87	2.70		
	(SUS. CK.) Ranger	24	4.16		
OTHER	(SUBMITTED)				
	(RES. CK.)				
	(SUS. CK.)				

^{4/} Give: The institution in charge of test, (2) year, and (3) location of test. Describe test procedure if it differs from procedure suggested in ARS-NC-19, September 1974.

12. DISEASE, INSECT, AND NEMATODE RESISTANCE: (Enter resistance of submitted and check cultivars. Circle check cultivars used.)

INSECT	CULTIVAR	% RESISTANT PLANTS	AVG. SEVERITY INDEX (ASI)	ASI LSD .05	TEST, YEAR & LOCATION ^{4/}
OTHER	(SUBMITTED)				
	(RES. CK.)				
	(SUS. CK.)				
NEMATODE	CULTIVAR	% RESISTANT PLANTS	INDEX (ASI)	ASI LSD .05	TEST, YEAR & LOCATION ^{4/}
STEM NEMATODE	(SUBMITTED)				
	(RES. CK.) LAHONTAN				
	(SUS. CK.) RANGER				
NORTHERN ROOT KNOT NEMATODE	(SUBMITTED)				
	(RES. CK.) NEV. SYN. XX				
	(SUS. CK.) LAHONTAN				
SOUTHERN ROOT KNOT NEMATODE	(SUBMITTED)				
	(RES. CK.) MOAPA 69				
	(SUS. CK.) LAHONTAN				
OTHER	(SUBMITTED)				
	(RES. CK.)				
	(SUS. CK.)				

13. INDICATE A VARIETY THAT MOST CLOSELY RESEMBLES THE VARIETY SUBMITTED FOR THE FOLLOWING CHARACTERS:

CHARACTER	VARIETY	CHARACTER	VARIETY
AREA OF ADAPTATION	Anchor	PLANT HEIGHT	Anchor
RECOVERY AFTER CUTTING	Anchor	WINTER HARDINESS	Anchor

REFERENCES

Barnes, D.K., and C.H. Hanson, An Illustrated Summary of Genetic Traits in Tetraploid and Diploid Alfalfa, ARS Technical Bul. 1370.
 Barnes, D.K., et al, Standard Tests to Characterize Pest Resistance in Alfalfa Varieties. ARS-NC-19, September 1974.
 Nittler, L.W., G.W. McKee, and J.L. Newcomer, Principles and Methods of Testing Alfalfa Seed for Varietal Purity. New York Agricultural Experiment Station Bul. 807.
 USDA Agricultural Handbook No. 424.

COMMENTS

TABLE 2

1974 Alfalfa Fall Dormancy Trial*

University of Minnesota

1974 Data

Entry	Minn. Seed Lot #	Number of plants in each class**										Average Score
		0	1	2	3	4	5	6	7	8	9	
African	2437	0	0	2	4	19	13	6	0	0	0	4.47
DuPuits		0	0	0	0	1	19	33	18	1	0	5.97
Saranac		0	0	0	0	1	11	21	25	12	0	6.46
Ranger	2449	0	0	0	0	2	5	15	27	5	1	6.49
Vernal VCC72	2695	0	0	0	0	0	0	8	16	15	1	7.21
Norseman	2405	0	0	0	0	0	0	1	6	35	22	8.14
LSD 5%												.54
1%												.72
CV												6.0

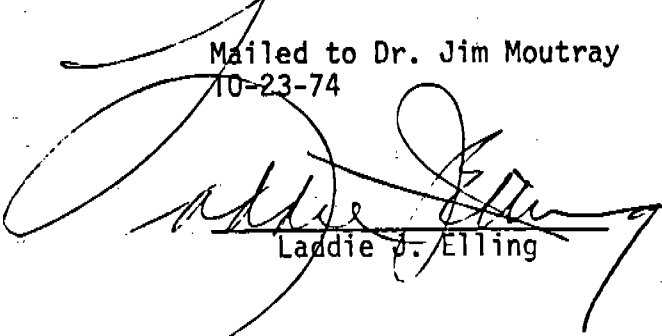
* Seeded 5-23-74 and thinned to one plant per 10-12 inches of row. Four replications. 22 ft. row per plot. Plants clipped 9-9-74. Fall dormancy reading made October 10, 1974.

** Fall dormancy scored as 0-9: 0 = 18 in. or higher, 1 = 16"-18", 2 = 14"-16", 3 = 12"-14", 4 = 10"-12", 5 = 8"-10", 6 = 6"-8", 7 = 4"-6", 8 = 2"-4", 9 = 0"-2".

Your entries: North American Plant Breeders

Citation Br.	3011	0	0	0	0	0	9	15	18	13	2	6.75
Citation Fdn.	3012	0	0	0	0	1	7	16	21	26	3	6.94
NAPB 41 Atlas	3058	0	0	0	0	0	13	23	26	17	1	6.62
NAPB 42 Victor	3048	0	0	0	0	0	3	24	21	8	2	6.69
NAPB 43 Olympic	3049	0	0	0	0	1	13	17	28	11	2	6.58
NAPB 44 Apollo	3050	0	0	0	0	0	4	25	28	17	0	6.75

Mailed to Dr. Jim Moutray
10-23-74


Laddie J. Elling

cc: Duane M. Smith

TABLE 4
1974 Spaced Plant Nursery¹, NABP Ames, Iowa
Fall Dormancy

Entry	1975 Data (height in inches) ² Number of Plants in Each Category																			1975 Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	0
Apollo	1	5	6	8	10	12	16	15	17	26	10	30	12	15	8	4	1	0	0	9.5
Atlas	0	2	1	5	5	16	23	33	15	29	17	25	6	9	6	3	0	0	1	10.1
Olympic	0	2	1	3	6	10	9	20	9	28	15	37	11	22	6	2	5	3	1	10.6
Victor	0	4	2	1	4	14	8	14	14	29	20	27	7	9	4	3	1	0	0	9.8
Nugget	0	1	3	5	6	8	8	16	10	30	17	13	10	6	1	1	0	0	0	9.4
Citation	0	1	4	5	6	10	17	27	18	17	20	18	7	6	3	0	0	0	0	9.4
Titan	0	0	4	6	9	20	15	25	14	18	15	10	6	7	2	2	0	0	0	8.7
Anchor	0	1	1	3	2	7	10	20	15	22	17	17	5	11	4	0	0	0	0	9.8
Vernal	1	5	5	9	13	19	25	24	20	22	16	15	4	2	2	1	0	1	0	8.2
Saranac	0	0	1	3	7	12	10	26	18	39	24	37	14	9	6	1	3	0	0	10.1

- 1 Seeded 5-14-74 and thinned to 12" spacing June '74.
- 2 1975 cut September 2, read October 14, average of 178 plants per variety.

TABLE 5

Fall dormancy of alfalfa varieties in forage trials

Entry	NAPB Ames, Iowa ¹					NAPB Brookston ² Indiana		Univ. Neb. ² Mead	Texas A & M ¹ Bushland	Univ. Wisc. ¹ Janesville
	10-22-74	10-14-75	10-22-74	10-14-75	10-15-75	10-28-75	10-6-75	10-15-75	10-22-75	
Apollo	6.12	11.6	6.0	14.1	5.9	5.4	---	11.4	7.62	
Atlas	---	---	6.5	14.1	6.4	4.0	---	13.0	---	
Olympic	7.32	13.7	6.5	14.1	7.3	2.2	4.25	13.4	9.35	
Victor	7.20	13.6	6.5	14.1	6.6	3.0	5.00	14.6	8.26	
Nugget	5.6	12.4	5.4	12.7	5.0	8.0	---	---	---	
Citation	6.1	12.2	5.6	14.1	4.9	6.0	5.00	---	---	
Anchor	5.4	13.2	5.6	13.2	5.4	6.4	---	9.1	---	
Titan	4.5	11.9	4.8	12.0	5.0	7.8	---	9.5	---	
Vernal ³	4.4	9.8	4.7	11.3	---	5.4	5.75	9.1	6.12	
Saranac	7.0	14.0	6.7	14.3	5.7	5.2	4.75	10.6	8.06	
Agate	5.2	11.6	4.8	12.2	4.9	8.4	---	8.3	---	
LSD 5%		1.9		.8		1.25				
C. V.		11.9		4.9		19.5				
Seeded	4-74		5-74		4-75	4-75	4-74	8-74	5-75	

¹ Height in inches² Higher ratings indicate less fall growth³ Left out of data from 1975 seedings. Seed received as certified Vernal does not have Vernal fall dormancy characteristics.

TABLE 6

Crown Width of Alfalfa Varieties at Ames, Iowa

Variety	Av. Width ¹		No. Plants
	Inches		
Anchor	4.78		139
Nugget	4.48		130
Citation	4.22		156
Apollo	4.05		195
Atlas	4.73		199
Olympic	4.34		185
Victor	4.79		158
Titan	4.94		160
Saranac	3.89		207

Seeded in 30" rows May 1974 and thinned to one plant per foot. Measured October 31, 1975.

TABLE 7

Pod Shape and Pubescence of NAPB Alfalfa Varieties, October 1975, Warden, Washington

Variety	% Plants With ¹				% Plants With	
	Pubescent Pods	Tight Pods	Loose Pods	Sickle Pods		
Anchor	89	86	14	0		
Nugget	66	87	13	0		
Citation	86	90	10	0		
Apollo	82	88	12	0		
Atlas	77	82	18	0		
Olympic	79	81	19	0		
Victor	93	84	16	0		
1	1-4 rating, 1 = most hair	1 + 2 = % pubescent pods				

TABLE 10

1975 Bacterial Wilt Trial
University of Minnesota

Entry	Minnesota Seed Lot No.	Average severity index*	Actual percent resistant plants**
Narragansett	AS-4	4.01	0.9
Ranger	AR-132	2.79	17.9
Vernal	FC 33696	2.30	34.2
LSD 5% level		.32	
LSD 1% level		.42	
CV		8.5%	

*Calculated on basis of average severity infection of individual plants in each of 3 replications (about 75 plants observed per entry per rep.).

Your entry(ies): Jim Moutray - North American Plant Breeders

Apollo (NAPB-44)	3137	2.32	29.1
Olympic (NAPB-43)	3138	2.23	31.5
Victor (NAPB-42)	3139	2.62	22.2
Atlas (NAPB-41)	3140	2.24	31.2

** Plants scored 0 and 1 (on a 1-5 scale) considered resistant.

TABLE 11

Anthracnose resistance of Apollo, Atlas, Olympic and Victor alfalfa

	Laboratory Tests					Field Rating	
	Virginia Poly. Institute ¹ Glenn Buss May - June 1975	Kansas State Univ. ² Don Stuteville Aug. - Sept. 1975	North Carolina ³ State-Thad Busbice May-June 1975	NAPB ⁴ Ames, Iowa Nov-Dec. 1974	Total Brookston, Ind. ⁵ Forage Trial 10-28-75		
	% resistant ⁶ plants	Total plants rated	% survivors	Plants tested	% resistant plants	% resistant ⁶ plants	plants rated
Apollo	69	32	3.3	240	34	11.7	165
Atlas	96	24	40.8	244	59	44.6	172
Olympic	87	31	42.4	239	41	54.5	182
Victor	85	41	50.8	235	59	40.1	155
Anchor	--	--	--	--	--	10.1	143
Saranac	36	28	2.5	208	21	--	--
Belts 2-An4	91	56	--	--	--	--	--
Arc	--	--	76.4	179	66	49.9	176
Saranac AR	--	--	--	--	--	--	--
LSD 5% level			21.2		17		1.2

1 "Inoculation did not take too well. Damping off also caused problems and severely reduced numbers before and during the inoculation. The data are not much more than rough indicators of resistance."

2 No ratings taken, survivors considered resistant.

3 "Test was not as good as hoped, higher than usual environmental factor. Value for Saranac is unrealistically high."

4 Test only fair as rhizoctonia invaded benches and made determinations difficult.

5 Ratings complicated by presence of mildew plus Leptosphaerulina and common leafspot

6 Test conducted using Barnes basic scheme. Ratings of 1 + 2 = resistance.

7 Lower numbers are most desirable.

Anthracnose (*Colletotrichum trifolii*)

<u>Variety</u>	<u>Year tested</u>	<u>Conducted</u>		<u>% Res. Plants</u>
		<u>by</u>	<u>at</u>	
Atlas	1979	NAPB	Ames, Ia.	52.5*
Iroquois				6.2
Maris Phoenix				11.5
Saranac - Sus.				6.3
Arc - Res.				65.0
L.S.D. (.05)				8.1
C.V. %				18.7

*Scoring system used: Plants scored 1 and 2 (on a 1-5 scale, 5=dead) considered resistant. Growth chamber test.

ANTHRACNOSE TEST¹

NORTH CAROLINA STATE UNIVERSITY--DR. THAD BUSBICE ARS/USDA

May 1976

Variety	% Survivors
Olympic	39.4
Victor	44.8
Apollo	9.0
Atlas	37.9
Saranac (Susceptible Check)	2.5
Saranac AR (Resistant Check)	26.2
Arc "	48.0
Av. of two resistant checks	37.1
LSD .05% level	13.0

¹ Very severe test with all percentages low

TABLE 12

Downy mildew resistance of Apollo, Atlas, Olympic and Victor alfalfa in Kansas State test by Dr. Don Stuteville-September, 1975

Entry	% Plants Mildew Free			I 5 and I 7 ¹ in combination
	Isolate			
	I 5	I 7		
Apollo	18.5	11.7		4.7
Atlas	30.0	30.4		12.0
Olympic	32.8	19.7		12.6
Victor	28.4	14.5		5.7
Saranac (Res. Ck.)	52.8	27.3		21.5
Anchor	36.8	39.0		21.6
Arc	---	---		4.8
Vernal	---	---		4.2
Agate	---	---		7.1
Kanza (Sus. Ck.)	1.0	1.9		1.1
LSD..05	10.4	9.8		21.2
1 Very severe test				



AUG 31 1976

Department of Plant Pathology
Dickens Hall
Manhattan, Kansas 66506
Phone: 913 532-6176

7 mildew

August 26, 1976

Dr. Jim Moutray
North American Plant Breeders
RFD #3
Ames, Iowa 50010

Dear Jim:

Your requested downy mildew evaluations are as follows:

<u>Entry</u>	<u>% of mildew-free plants</u>
Victor	5.3
Olympic	13.4
Atlas	13.5
Saranac (SCC 72)	21.7
Saranac AR	23.6
LSD .05	4.8

I am also enclosing raw data which you may wish to check.

Sincerely,

Donald L. Stuteville
Forage Pathologist

DLS/slt

Enclosures

TABLE 14

1975 Phytophthora Trial

University of Minnesota

Entry	Minn. Seed Lot No.	Average severity index*	Actual Percent resistant plants**
Saranac (SCC 72)	3043	5.26	0.0
15 x 17 (Syn. 2)	2895	5.55	0.0
Agate (Foundation)	2892	3.34	20.0
LSD 5% level		0.49	
LSD 1% level		0.65	
CV		8.5%	

*Calculated on basis of average severity infection of individual plants in each of 4 replications.

**Plants scored 1 and 2 (on a 1-6 scale) considered resistant.

Your entry(ies): Jim Moutray - North American Plant Breeders

Atlas	3140	5.51	0.0
Olympic	3138	4.75	1.5
Victor	3139	4.87	0.0
Apollo	3137	3.90	12.5

TABLE 17

1974 Spaced Plant Nursery, NAPPB, Ames, Iowa
 Leafhopper Yellowing Tolerance¹

Entry	% resistance ²	Average Severity ² Index	Number of Plants Rated
Apollo	59	3.40	178
Atlas	38	3.95	133
Olympic	65	3.31	175
Victor	56	3.38	146
Nugget	45	3.83	120
Citation	55	3.48	154
Titan	53	3.52	144
Anchor	16	4.63	128
Vernal	55	3.56	163
Saranac	37	3.97	201
Ranger	24	4.16	186
Weevlchek	87	2.70	198
LSD .05		.37	
C.V. %		16.2	

1 Seeded 5-14-74 and thinned to 12" spacing June '74, ratings made 8-27-75.

2 Procedures used are those described in ARS-NC-19, 1 - 9 rating, 1 - 3 counted as resistant.
 Lower ASI ratings are most desirable.

TABLE 18

Leafhopper yellowing tolerance of alfalfa varieties in NAPB forage trials¹

Entry	Ames, Iowa 7-17-74	Ames, Iowa 7-6-75	Ames, Iowa 7-17-74	Ames, Iowa 7-6-75	Ames, Iowa 8-28-75	Brookston, Ind. 7-1-75	Brookston, Ind. 8-13-75	Brookston, Ind. 6-26-75	Brookston, Ind. 8-25-75	Average	
Apollo	4.8	3.2	3.6	3.8	3.2	3.0	6.0	5.8	4.2	2.8	4.0
Anchor	5.2	4.8	5.0	5.0	4.0	7.4	7.4	6.8	4.2	4.4	5.4
Atlas	--	--	4.0	4.6	3.4	--	--	3.8	3.0	3.4	--
Olympic	4.8	4.2	4.0	5.0	2.8	6.2	5.8	4.4	2.6	2.8	4.3
Victor	4.4	3.0	3.2	4.2	2.8	5.8	7.2	5.6	3.6	2.4	4.2
Nugget	5.2	4.0	3.8	4.4	2.6	6.2	7.2	6.4	3.6	4.8	4.8
Citation	5.0	3.8	4.0	4.2	2.6	6.4	6.6	3.6	2.8	2.6	4.2
Vernal ²	5.0	3.8	4.0	4.6	--	5.6	4.6	3.6	--	--	--
Saranac	5.4	5.2	4.6	5.0	4.0	7.5	8.2	5.6	3.6	2.4	5.2
Titan	4.2	3.0	3.6	4.0	2.0	4.4	4.6	3.6	2.0	2.2	3.4
Agate	5.6	5.3	4.2	5.0	4.2	3.8	6.6	7.0	4.4	4.0	5.0
Seeded	4-74	5-74	4-75	4-74	5-74	4-75	4-74	5-74	4-75		

1 Lower numbers indicate less yellowing

2 Left out of data from 1975 seedings. Seed received as certified Vernal does not have Vernal fall dormancy characteristics.

TABLE 19

Bloom Note on Alfalfa Varieties at Hutchinson, Kansas

Variety	% Flowering ¹
Titan	27
Anchor	39
Vernal	23
Saranac	42
Apollo	33
Atlas	48
Victor	52
Olympic	38
Citation	61
Nugget	47
Agate	27
Kanza	25

¹ First cutting made 5-20-75, bloom note taken 7-1-75 in forage plots

TABLE 20
1975 Seed Yield of alfalfa varieties at Warden, Washington¹

Entry	% of checks ¹
Apollo	128
Atlas	132
Olympic	135
Victor	81
Nugget	135
Citation	134
Anchor	79
Vernal	85
Saranac	98
Titan	137
Agate	100
LSD 5%	45.9
C. V.	69.4
Checks average 1bs/acre = 629	
¹ Checks are Titan, Anchor, Vernal and Saranac	
Seeded May 1974 in 44" rows at 2 lbs/acre	

Exhibit D (second revision 11-16-81)

'Atlas'

'Atlas' is most similar to the variety 'Olympic'. 'Atlas' differs from 'Olympic' by having greater resistance to anthracnose race 2. 'Atlas' also differs from 'Olympic' by its greater fall dormancy and less tolerance to potatoe leafhopper yellowing.

EXHIBIT E

Statement of the Basis of Applicant's Ownership

Atlas was bred by North American Plant Breeders.

BILL OF SALE AND ASSIGNMENT

KNOW ALL MEN BY THESE PRESENTS that AGRIPRO BIOSCIENCES INC., a Delaware corporation (hereinafter referred to as "Seller"), pursuant to that certain Asset Purchase Agreement of even date herewith by and between Seller and AGR ACQUISITION CORPORATION, a Delaware corporation (hereinafter referred to as "Buyer") and for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, does hereby grant, bargain, sell, assign, convey and deliver unto Buyer, all of Seller's right, title and interest in and to the plant varieties owned/registered by Seller and more particularly set forth on Exhibit A attached hereto for which PVP Certificates have been issued by or may be pending before the U. S. Department of Agriculture.

TO HAVE AND TO HOLD UNTO PURCHASER, its successors and assigns forever.

IN WITNESS WHEREOF, Seller has executed this Bill of Sale and Assignment as of the 30th day of June, 1994.

AGRIPRO BIOSCIENCES INC.

BY: W. A. Zama
Title: President

STATE OF KANSAS, COUNTY OF JOHNSON

Before me, the undersigned, a Notary Public of the State and County aforesaid, personally appeared W. A. ZAMA with whom I am personally acquainted (or proved to me on the basis of satisfactory evidence) and who, upon oath, acknowledged himself to be the PRESIDENT of Agripro Biosciences Inc., the within named bargainer, a corporation, and that he as such PRESIDENT, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing the name of the corporation by himself as PRESIDENT.

WITNESS my hand and Notarial Seal at office the day and year above written.

Alma M. Weaver
Notary Public

My Commission Expires:

June 22, 1998

ALMA M. WEAVER

NOTARY PUBLIC

STATE OF KANSAS

My Appt. Exp.

June 22, 1998

Office of the Secretary of State

I, EDWARD J. FREEL, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE CERTIFICATE OF AMENDMENT OF "AGR ACQUISITION CORPORATION", CHANGING ITS NAME FROM "AGR ACQUISITION CORPORATION" TO "AGRIPRO SEEDS, INC.", FILED IN THIS OFFICE ON THE THIRTIETH DAY OF JUNE, A.D. 1994, AT 4:30 O'CLOCK P.M.

A CERTIFIED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS FOR RECORDING.



A handwritten signature in cursive script, reading "Edward J. Freel", is written over a horizontal line.

2394087 8100

944121584

SECRETARY OF STATE
AUTHENTICATION:

7169071

DATE:

07-01-94

06/30/94 14:25 0913 384 0206

ABI SHAWNEE MSN

002/002

CERTIFICATE OF AMENDMENT
OF
CERTIFICATE OF INCORPORATION
OF
AGR ACQUISITION CORPORATION

AGR Acquisition Corporation, a corporation organized and existing under and by virtue of the General Corporation Law of the State of Delaware,

DOES HEREBY CERTIFY:

FIRST: that the Board of Directors of said corporation, by the unanimous written consent of its members filed with the minutes of the Board, adopted a resolution proposing and declaring advisable the following amendment to the Certificate of Incorporation of said corporation:

RESOLVED, that the Certificate of Incorporation of this corporation be amended by changing the Article thereof numbered "ARTICLE I" so that, as amended, said Article shall be and read as follows:

"ARTICLE I

Name

The name of the corporation (hereinafter called the 'Corporation') is Agripro Seeds, Inc."

SECOND: That in lieu of a meeting and vote of stockholders, the sole shareholder of the corporation has given unanimous written consent to said amendment in accordance with the provisions of Section 228 of the General Corporation Law of the State of Delaware.

THIRD: That the aforesaid amendment was duly adopted in accordance with the applicable provisions of Sections 242 and 228 of the General Corporation Law of the State of Delaware.

FOURTH: That the capital of said corporation shall not be reduced under or by reason of said amendment.

IN WITNESS WHEREOF, said AGR Acquisition Corporation has caused this certificate to be signed by Gary T. Hancock, its President, and attested by Ann Steelman, its Secretary, this 30th day of June, 1994.

AGR ACQUISITION CORPORATION

BY: Gary T. Hancock
Gary T. Hancock, President

ATTEST:

BY: Ann Steelman
Ann Steelman, Secretary

LAW OFFICES

BURCH, PORTER & JOHNSON

130 NORTH COURT AVENUE

MEMPHIS, TENNESSEE 38103

TELEPHONE 901-523-2311
TELECOPIER 901-523-7140

July 25, 1994

CHAS. N. BURCH 1888-1938
H. D. MINOR 1888-1947
CLINTON H. HICKAY 1889-1943
JESSE E. JOHNSON, JR. 1913-1980
JOHN S. PORTER 1909-1990MORGAN KEEGAN OFFICE
50 NORTH FRONT STREET
SUITE 850
MEMPHIS, TENNESSEE 38103
TELEPHONE 901-527-2311
TELECOPIER 901-527-4199LUCIUS E. BURCH, JR.
W. J. MICHAEL CODY
JOEL PORTER
CHARLES F. NEWMAN
C. THOMAS CATES
JOE W. DUNCAN
JOHN A. STEHMLER
J. BROOKE LATHRAM
JEFFERSON L. LAMAR
DEWITT M. SUT, JR.
R. MICHAEL POTTER
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MELISSA A. MARAVICH
RICKY E. WILKINS
TODD A. ROSE
REVA N. KRIEDEL
SUSAN CLARK TAYLOR
DOUGLAS F. MALIJAN
JOHN W. CAMPBELL
R. PORTER FIELD

Ms. Ann Zempolich
Plant Variety Protection Office
U. S. Department of Agriculture
500 NAL Building
10301 Baltimore Boulevard
Beltsville, MD 20705



Re: Agripro Biosciences Inc. Sale of PVPs to AGR Acquisition Corporation (which has changed its name to Agripro Seeds, Inc.)

Dear Ms. Zempolich:

I am enclosing herewith the Bill of Sale and Assignment wherein Agripro Biosciences Inc. has sold and assigned all of its right, title and interest in and to the PVPs listed on the attachment to the Bill of Sale to AGR Acquisition Corporation and hereby request that your records be changed to show the new owner as Agripro Seeds, Inc., the new name of AGR Acquisition Corporation. It is our understanding that the attachment was generated by someone in your office and forwarded to Agripro Biosciences Inc. at its request, and was subsequently forwarded to our office as attorneys for the purchaser in connection with the sale transaction.

As I indicated to you in our several previous telephone conversations, AGR Acquisition Corporation changed its corporate name to Agripro Seeds, Inc. the same date as the closing of the sale. I am enclosing herewith a copy of the Certificate of Amendment filed by the Delaware Secretary of State wherein the corporate name is changed.

If I counted correctly, there are 149 PVP certificates listed on the attachment to the Bill of Sale and Assignment. I am enclosing a check in the amount of \$3,725.00 payable to United States Treasury in payment of the \$25.00 per certificate fee to change the owner's name on your records.

THIS DOCUMENT HAS A COLORED BACKGROUND — NOT A WHITE BACKGROUND		THIS DOCUMENT HAS A COLORED BACKGROUND	
	HELENA CHEMICAL COMPANY Suite 3200 — Clark Tower 5100 Poplar Avenue Memphis, Tennessee 38137		DATE 7-8-94
			CHECK NUMBER 22406
PROTECTION AMOUNT	EXACTLY PAY 37250000		PAY THIS AMOUNT \$3,725.00
PAY TO THE ORDER OF	United States Treasury		HELENA CHEMICAL COMPANY by 
		AUTHORIZED SIGNATURES	